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COMPUTERS:
Stepping Into Tomorrow

Video

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video

August, Nineteen Hundred and Eighty Volume Four, Number Five



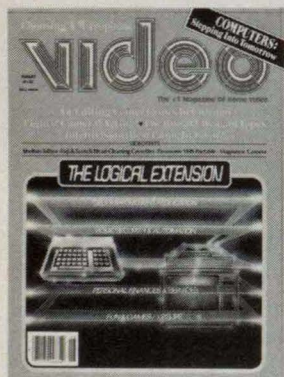
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Drawn by Alan Hashimoto, the illustration represents what many consider the foundation for the future of personal video—the home computer. Encased in multi-colored laser beams, the computer of tomorrow is the logical extension of today's color TV and videocassette recorder.

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Arcade Alley

A Critical Look at Video Cartridge Games & Programs

by Bill Kunkel & Frank Laney

Armchair Athletes Sports, Mattel-Style

Adapting team sports like football and baseball to the home arcade frequently poses severe problems for electronic game manufacturers. Yet the tremendous popularity of such software keeps designers hunkered over their work tables till the wee hours thinking up ways to translate the color and excitement of the "real thing" to the home screen.

With the capabilities of an authentic minicomputer at their disposal, Mattel designers have overcome many of the difficulties that have plagued previous attempts to create arcade sport contests. In fact, sports cartridges are the heart and soul of the company's lineup of games for the recently released Intellivision modular computer system. Virtually overnight, Mattel has seized leadership in the home arcade sports field.

The major problem with sports games boils down to control. How can one contestant effectively direct the on-screen actions of nine baseball or eleven football players simultaneously?

Thus far, designers have developed two possible solutions. The first, often used by Atari and to a lesser extent Magnavox, favors streamlining the sport. This means stripping it down to a few basic elements instead of trying for a comprehensive simulation. The result is a cartridge that mimics the flavor of a sport without realistically reproducing on-the-field action. Atari's **Home Run** baseball is a fine example of how well this impressionistic approach to sports can work.

The chief alternative involves transferring much of the responsibility for what's happening on the video screen to the machine. In both Bally and Magnavox **Football**, for example, player-control automatically shifts from the quarterback to the pre-programmed wide receiver as appropriate, while the system itself moves the rest of the offense around the gridiron.

Judging by the initial trio of sports cartridges we're reviewing this month, Mattel's design staff is firmly committed to the latter method. Their games achieve a high degree of realism without greatly sacrificing playability by letting the arcader make

and easy to learn, but the games themselves take plenty of practice to play skillfully. The best advice is to try the slowest game speeds first and gradually increase the tempo as the control routines become second nature.

Major League Baseball (2614-0920A). Virtually all video game companies offer baseball, because it has proven to be the easiest team sport to transform into electronic form. Good as some of the other manufacturers' cartridges are, however, the Mattel version simply blows them away.



Intellivision's sports games "achieve a high degree of realism."

the most important decisions and assigning much responsibility for maneuvering the video athletes to the computer.

The unique hand controllers described in last month's *Arcade Alley* make this approach entirely workable. The keypad-action button-direction disc combination helps players juggle a wide range of variables even when the action gets fast and furious. Beginners may find it annoyingly necessary to glance away from the screen to input their moves just when their attention is needed most desperately, but the logical organization of the Mylar keypad overlays cures this problem with time. Players will only have to look away from the playfield occasionally once the game mechanics are mastered, since "touch keying" isn't really all that hard to learn.

This brings up an important warning for prospective players: Don't expect to become an instant expert. The rules are clear

The system's extra computing power makes it possible for batters to either swing for the fences or lay down a bunt and for runners to advance after a sacrifice fly, take leads, steal bases, or even get picked off if they become too reckless. For the first time in home arcade history, you can hit and run, rattle the enemy hurler with flashy base-running, and even try a suicide squeeze!

On the other hand, Intellivision **Major League Baseball** puts less emphasis on pitching than most other baseball games. The manager of the team in the field presses a spot on the edge of the direction disc to select the pitch: 12 o'clock is a smoking fast-ball, 6 o'clock is a lazy cange-up, while 3 and 9 o'clock produce, respectively, inside and outside curves. Would-be Ron Guidrys will probably prefer video baseball games that permit com-

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Bill Kunkel is a New York-based writer and veteran video game addict. He shares his mania with Frank Laney, another New York freelancer.

New Products



TDK VHS Cassette Cleans VCR Heads

A non-abrasive VHS videocassette head cleaner, model TCL-30, has been introduced by TDK. Ten meters of head cleaning tape provide 200 cleanings (or passes) in the Standard Play (SP) speed position on a VHS model.

The company says its cleaner, once inserted like a regular tape, will remove dust and oxide deposits from the VCR's audio record head, audio erase head, and the video record/playback head.

Price, \$25.

To receive further manufacturer's information, circle No. 85 on Reader Service Card.

Four Games from Activision To Play on Atari System

Drag Race, Boxing, Checkers, and Fishing Derby are the first four games from a company called Activision, which has started offering cartridges that will play in the Atari

Video Computer System or Sears Tele-Game Arcade.

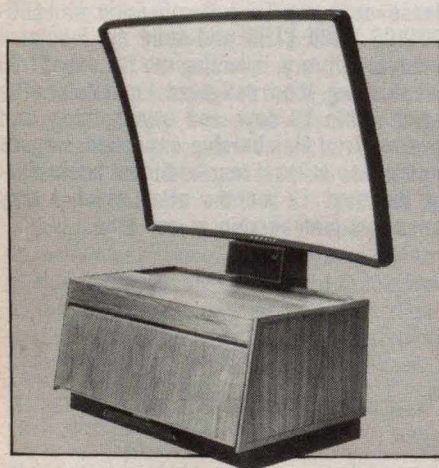
Price, \$21.95.

To receive further manufacturer's information, circle No. 86 on Reader Service Card.



One-Piece Advent Video Beam Features 5-ft Screen

The VideoBeam 125 from Advent is housed in a low-profile walnut veneer



cabinet with a pull-out drawer containing the mirror that reflects the TV image from three projection picture tubes onto a 5-ft. diagonal screen.

A wireless remote control panel performs five functions, and an RF selector switch allows access to three input sources, such as cable TV, computer, video game, VCR, or videodisc. Included are acoustic suspension speakers, which the company first popularized for home hi-fi systems.

Controls are found on the lip of the drawer. Other features are two direct video inputs (for camera use), audio and video recording outputs, audio output with volume control to connect to a stereo speaker system, and an accessory AC outlet.

Price, under \$4000.

To receive further manufacturer's information, circle No. 87 on Reader Service Card.

More New Products on page 73

TITLES YOU WILL SEE ON SELECT PROGRAM'S PREVIEW CASSETTE

Tunnel Vision

The Groove Tube

Reefer Madness

Cocaine Cowboys

Shame of the Jungle

Attack of the Killer Tomatoes

Halloween

High Velocity

Night of the Living Dead

End of the World

Laser Blast

Slithis

Day of the Triffids

Fantastic Animation Festival

A Boy and his Dog

The Clowns

Flesh Gordon

Alice in Wonderland

The First Nudie Musical

Cheech & Chong Perform

The Farewell of Cream Concert

Volunteer Jam

Superman
(the cartoon original)

Plus 1 hour
cartoon classics of
the 1930's

FREE
plus 2
spectacular
surprises

This article begins with a confession: for as long as I can remember, I have been a lover of gadgets. Not simple household gadgets that lacerate cucumbers but serious gadgets whose flashing lights and logical beeps and buzzes create the mechanized versions of human personality. I adore little TV sets. Electronic football games. All kinds of pinball games. Calculators that improvise on the music of Brahms. Videocassette and videodisc players that allow you to make a vast scan through hours of television in minutes. But none of these marvels, despite their control over my leisure hours, has the

depth of personality possessed by my ultimate gadget, the Atari 800 Personal Computer.

I was the first kid on my block to own a computer, and frankly, I am not sure why. I know that a sophisticated thinking machine is something I have considered for a while, but I have no pressing need for the standard routines offered by most computers for home or small business. There are no mailing lists I must attend to, no educational coursework I care to study from words and sentences on my color TV, no income tax calculations not already serviced by my trusted accountant. And my checkbook is usually in a state of balance, so the 800 will not salvage my finances from ruin. My friends appreciate my interest in games of all sorts, and have linked my interest in computers to my fascination for game-playing. They're not wrong about this, but they're not totally right, either. There is more to my love for the 800 than mere games. It is a demanding partner, whose scrutiny for the accurate use of every space, every semi-colon, every comma—also known as "syntax"—requires my total concentration.

When the computer and its assorted peripherals arrived, I couldn't wait to tear open the cartons. The first box contained the Atari 800 keyboard/computer console, along with a small cassette recorder which Atari has chosen to call the 410 Program Recorder, a few assorted cords and connectors, a textbook called *Atari Basic*, an operator's manual, and two program cartridges. The second container held a nondescript gray box, with some paper hanging out of the top: the Atari 820 Printer, a small version of the big-time printers I'd seen in various computer centers in my travels. My wife was visibly impressed. The third and final box contained the 810, which is a tabletop disc drive, a device for recording programs written on my computer.

I lined all of the machinery up on our coffee table, strung the appropriate cables to the back of the TV set (the computer

sets up just like a videogame—just a little twisting and switching, the set becomes something very different from television), plugged the Basic cartridge into the right slot, and started working with my brand-new computer.

My first ventures were not at all ambitious. The first thing I did was to type my name, then my wife's name, then my dog's name, and watched the letters appear on my TV screen. That was rather amazing in its own right, but the novelty wore off quickly. Then I

HOW I LEARNED TO STOP WORRYING AND LOVE THE COMPUTER

by Howard Blumenthal

learned my first command, PRINT, and my first bit of syntax. First, I typed in PRINT "2 5," and instead of a 7, the computer replied with precisely what I had asked for, the phrase 2 5. I tried the exercise again with names instead of numbers, and sure enough, the computer reacted one way with the quotes and another without (it refused to print anything when I left out the quotes). Within a few minutes I knew how to multiply, divide, add, subtract, and even create exponential expressions.

Since my attention span is not always as long as it might be, I shifted cartridges and stopped my programming career for the moment in order to play some basketball. I replaced the Basic cartridge with one labeled Basketball, plugged in a joystick into the front of the keyboard (these are the same joysticks that Atari uses in their videogame system), and enjoyed a short match of one-on-one. In this game, I used only the joystick, not the keyboard, and felt as though I was squandering my first precious moments with this fabulous toy. And so I left the courts in favor of a game entitled Star Raiders.

I was not expecting to live through my own version of Star Wars. Star Raiders is a full-blown computer simulation, just like those intense battles that those programmers used to play in college. You are the commander of a ship that is zipping through space trying to destroy the Zylon empire. You choose your mission difficulty (which is more than just a matter of speed here), and start an excursion during which time you must constantly consider your use of energy, your position in the universe (a galactic chart replaces front or aft viewing screen when you touch the letter G on your keyboard), and your strategies for attack. It is a thinking exercise as well as a game of fast action, a wonderful fantasy, and one of the most exciting diversions I've experience in a long time.

Enough time spent on the space game—time for another cartridge. Only two others came with my initial order (each one must be bought separately, with two exceptions—the Basic cartridge, and a master Educational System cartridge, which come with the 800), a Video Easel, which allows drawing in a variety of shapes, colors and line widths on the screen, and a Video Chess, which is pretty much what most such games are like. There are a few other cartridges scheduled for 1980 introduction, including Super Breakout, a variation on the

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The Basic Language Of Computers

A painless primer introducing you to the ABC's of 'home computerese'

Learning a new language is, to most people over the age of ten, an intimidating prospect. And for most people, the idea of getting acquainted with computers is akin to developing a second language: foreign, mysterious, and somewhat cold. Though children often exhibit an uncanny proclivity with both languages and computers, we're not suggesting that learning the language of computers is child's play, but it is easy. It's just a matter of understanding exactly what a computer is and what it can—and can't—do.

At a minimum, a computer must have three basic parts: a *processor* to handle information; *memory* to hold both that information (*data*) and the *programs* that tell the processor how to handle it; and some sort of *input* and *output* (I/O, for short) to handle its communications.

Anything else comes under the heading of accessories, or *peripherals*—though it's important to remember that the peripherals in a computer system can wind up

Computer jargon is full of abbreviations for basically comprehensible—but jawbreaking—expressions. The *processor* for example, is frequently called a CPU (Central Processing Unit) or MPU (Micro-processor Unit).

When it's all by itself, the CPU is very much like a newborn baby, with the potential to do nearly anything but without knowledge even of how to suck its thumb. Given the right program of instructions, The CPU can move data in and out and shift it around in memory, perform additions and subtractions, do logical comparisons, and react to changes in its situation, or rather, in the data it has access to.

The program is a non-material part of the computer, which is why it's called *software*, as opposed to the *hardware* that makes up the computer's visible and tangible side. Home computers usually run two programs at once: the program you're running (which you may even have written yourself) and an *interpreter* that turns your program into the computer's own machine code. If your program, for exam-

GUIDE TO PERSONAL COMPUTERS GUIDE TO PERSONAL COM

HEATH

Model H89

- Price:** \$1695
- Description:** Complete system; includes CRT terminal, mini-floppy discs, two built-in 2-80 microprocessors, numeric keyboard, normal typewriter keyboard, cassette interface.
- Memory:** 16K RAM, expands to 48K.
- Accessories:** H-77, expansion device with disc drives (single: \$595; second: an additional \$325). Three-port serial interface (\$85). 16K RAM chip set (\$150).
- Color:** b/w

Model H8

- Price:** \$299
- Description:** Based on 80/80A CPU; includes front panel, octal keyboard, readout.
- Memory:** Up to 64K RAM.
- Accessories:** H-17, floppy disc with single drive (\$575; second drive, an additional \$325). 16K wired memory board (\$345). 8K wired memory board (\$175). Extender board (\$40). Music synthesizer (\$259). H8-2, parallel interface (\$150). H8-4, four-port serial IO (\$175). H8-5, serial IO with cassette interface (\$95).

Model H11-A

- Price:** \$1195
- Description:** For more scientific usage; but still in home price range.
- Accessories:** H27, dual-drive 8-inch floppy disc system (\$1995).

General Peripherals

- Terminal:** H19 smart CRT with 12-inch screen, numeric keypad, reverse video and graphics characters; controlled by Z-80 microprocessor (\$675).
- Printer:** H14, matrix controlled by microprocessor (\$595)
- Software:** H89-17 package; includes Benton Harbor Basic, two-pass absolute assembler, text editor, utility programmer, console, debugger (\$150). H8-21, microsoft Basic (\$150). H8-17 package; same as H89-17 package, but for H8 system (all

software for H8 runs on H89) (\$150). HT11 package; includes text editor, assembly language, linker, librarian, peripheral interchange, on-line debugging, Basic interpreter, utility programs (\$350). HT11-1, Fortran (\$250). Heath Users Group (HUG), 500 programs available to anyone owning a Heath computer (price: N.A.).

Color: GDZ-1320, assembled 13-inch color monitor, available from Zenith (\$479.95).

RADIO SHACK

Model TRS-80-1

- Price:** \$499
- Description:** Includes keyboard, video display, cassette recorder, power supply, all cables for hookup, two game tapes, and one blank tape.
- Memory:** 4K, expandable to 16K; with additional equipment, expands to 48K.
- Accessories:** Hookup voice synthesizer (\$399).
- Color:** b/w
- Resolution:** 16 x 64 characters.

Model TRS-80-2

- Price:** \$849
- Description:** Same system as TRS-80-1, but with greater memory.
- Memory:** 16K expandable.
- Accessories:** Vox Box, voice recognition (\$169.95). OK (\$299); 16K (\$488); and 32K (\$597). expansion interfaces. Quick Printer II, gives 16 or 32 characters per line (\$219). Quick Printer I, gives 20, 40, or 80 characters per line (\$499). Line Printer II, gives up to 100 characters per second, 80 characters per line (\$799). Line Printer I, gives 60 characters per second (roll feed: \$1299; tractor feed: \$1598).
- Color:** b/w

Model TRS-80 No. II

- Price:** \$3899
- Description:** Includes one 8-inch floppy disc, standard keyboard.
- Memory:** 64K RAM.
- Accessories:** Disc drive expansion system (\$1150 for one; \$1750 for two; \$2350 for three).
- Color:** b/w

ple, consisted of just one step:

SUCK YOUR THUMB

the interpreter would tell the computer:

1. OPEN MOUTH
2. THUMB=OBJECT AT END OF ARM
3. EXTEND THUMB
4. RAISE THUMB TO LEVEL OF MOUTH
5. MOVE ARM INWARD TIL THUMB CONTACTS MOUTH
6. CLOSE MOUTH SLIGHTLY
7. READ UP CONTACT SENSORS
8. IF LIPS DO NOT CONTACT THUMB, GO BACK TO STEP 6
9. STOP CLOSING LIPS

And so on. This shows how dumb unprogrammed computers are, and how smart babies are by comparison—especially when you consider that this sample program is actually a vast simplification of the actual program a baby follows.

Babies learn a lot, but they're born with a few things programmed into them: the ability to breathe, some ability to squirm, a

few reflexes, and a vast, unquenchable urge to learn about themselves and their new environment. A computer usually has a somewhat similar built-in program called its *monitor*, or *operating system*. This usually resides permanently on chips of *Read-Only Memory (ROM)*. (Programs permanently inscribed on chips combine the properties of both hardware and software—so they're called *firmware*.)

At a minimum, the monitor tells the computer how to accept input and produce output. Often it tells it how to do a great deal more, such as move data around in the other parts of memory, compare two blocks of data to see if they are the same, display data in different forms, and so on.

The "other parts of memory" just referred to are called *RAM*, for *Random-Access Memory*. Most computers have more *RAM* than *ROM*.

The two types of memory are nearly opposites. *ROM*, once written into, cannot readily be rewritten, and it never forgets its contents, even if the power is shut off. That makes it ideal for monitor programs,

which must be on tap when you turn the computer on so it can understand whatever else you choose to tell it. *RAM*, by contrast, can be rewritten any time you please, which allows it to hold changeable data, or to hold first one program, then another, as your needs change. The catch is that *RAM* starts forgetting its contents within seconds after the power is shut off.

Every cell of memory holds only one bit, the smallest possible quantity of information. A bit can have only one of two possible meanings, usually defined as "0" or "1." That's easy to define electronically but not terribly useful as realworld information goes. A 1-bit computer could provide only two answers (yes or no) to at most two questions. For that reason, most computers organize their data and instructions into longer *words*, usually of 8 bits (called one *byte*) or, in some of the newer ones, 16 bits. (Big computers go on up to 32 bits and more, but home computers aren't likely to do so soon.)

Each "word" of memory has its own address, usually within an address range of 0 to 65,535, for a total of 65,536 possible addresses, counting the zero address. Like

PUTERS GUIDE TO PERSONAL COMPUTERS GUIDE TO PERS

COMPUCOLOR

Compucolor II

Price: \$1495 (8K memory); \$1695 (15K memory); \$1995 (32K memory)

Description: Includes monitor, disc drive, video, memory logic, 72-key keyboard.

Memory: 8K RAM, 15K RAM, or 32K RAM.

Accessories: Expandable keyboard, 101 keypads and color (\$135); 117 keys (\$200). Lower case (\$150). Extra disc drive (\$495). Soundware, plays music over machine (\$49.95). Add RAM board, for use with the two high-memory machines (\$375).

Colors: 8

Resolution: 128 x 128 characters; 384 x 256 special characters.

Telephone: (800) 241-4310

ATARI

Model 400

Price: \$600

Description: Includes standard 57-stroke keyboard (no raised keys), TV switch box (RF modulator), Atari Basic chart.

Memory: 8K, expandable to 16K with \$200 option.

Accessories: Additional memory (8K: \$124.95; 16K: \$199.95). Program recorder (\$89.95). Education system master cartridge (\$24.95). "Invitation to program" cassette (\$19.95). Entertainment cartridges (\$39.95 to \$59.00 each). Education system programs (\$29.95 each). 810 disc drive (400 model must adapt with additional 16K memory) (\$699.95). 820 Printer, 40-column (\$599.95). 825 Printer, 80-column (available this August). 830 acoustic modem, permits computer to "talk" via telephone (available this fall). 850 interface module; printer and modem must be connected to this module to connect to other companies' peripherals (available this fall). Paddle controls and joysticks (\$19.95 each).

Telephone: (800) 538-8547

Model 800

Price: \$1090

Description: Includes standard keyboard, monitor jack on side (does not need RF monitor), Atari Basic cartridge.

Memory: 8K, up to 48K.

Accessories: Same as for the 400.

Colors: 16

Resolution: 320 x 192 dots.

Telephone: (800) 538-8547

TEXAS INSTRUMENTS

Model TI99/4

Price: \$950 (console alone)

Description: Includes 16-bit microprocessor, built-in Basic, sound effects, five-octave musical scale; built-in equation calculator.

Memory: 16K RAM; 26K ROM, up to 30K with added command modules.

Accessories: 13-inch color monitor (\$450). Solid-state speech synthesizer (\$150). Disc memory drives (\$500 each). Disc memory control (\$300). Telephone coupler/modem (\$225). Thermal printer (\$400). RS-232 interface (\$225). Dual cassette cables (price: N.A.). Wired remote controllers (price: N.A.).

Colors: 16

Resolution: 24 x 34 characters

Telephone: (800) 692-1353; in Texas: (800) 858-1802

APPLE

Apple II & Apple III

Price: \$1195 to \$4500 (Apple II); \$4000 to \$8000 (Apple III)

Memory: 16K, up to 64K.

Accessories: Mini-floppy disc drive (magnetic storage medium) (\$495). Controller, lets discs exchange information (\$240). Black-and-white monitor (\$240). Printer; Silent-type, uses thermal paper; serial interface (prints one character at a time) or parallel interface (prints several characters at once) (\$595). Communications interface, permits computer to dial telephone automatically (\$400). Entertainment, business, accounting programs (from \$25 each).

Colors: 6 to 16

Resolution: 280 x 192 dots (Apple II). 560 x 192 (Apple III).

Telephone: (800) 538-9696; in California: (800) 662-9238

Computers

most familiar words used in computer lingo, this one can be misleading. While you may know where an address like "235 Park Avenue South" is physically, the computer doesn't know the physical location of any of its memory addresses. In most computers, you can physically interchange memory boards without changing their addresses.

That's because a memory address is not so much a location as a code, rather like the combination to a lock. To write data into a byte of memory, or to read data from that byte, the computer sends out that byte's address code. All the memory in the system reads that code at once, but only the byte being addressed reads that code and understands the combination that unlocks that one byte in particular.

The amount of memory in a computer is usually specified in terms of *kilobytes*, or *k* for short. Though "kilo-" in other contexts means "1000" and is abbreviated by a lower-case "k," a computer kilo is 1024, and it is abbreviated by the uppercase "K." Having ten fingers, we've developed a 10-valued number system that makes it natural for us to figure in such powers of 10

as the hundred (10^2), the thousand (10^3), and the million (10^6). Computers, working with two-valued bits, figure in powers of 2 instead. We humans have therefore latched onto the similarity between a computer's 2^{10} —1024—and our own "thousand" as a handy way of keeping mental track of the quantities involved.

The more memory a computer has, the more data it can hold at once, and the longer the program it can handle that data with. Most microcomputers come with at least 4K (4096 bytes) of RAM memory and rarely with more than 16K (16,384), but most let you add more later. Most small computers have 16-bit address lines, for a maximum of 65K (2^{16}) address bytes. In practice, though, you can never fill that entire address space with RAM, because anywhere from 2K to 16K of that system will be filled with firmware in ROM.

The Way to a Computer's Heart: I/O

The power in a computer is sealed in, uselessly, unless there's some way to *input* data and programs and to *output* the results. This is done through *ports*, circuits that transfer information in and out when properly addressed by the CPU. Port addresses, like memory addresses, are not

physical locations so much as codes that serve as combinations to electronic "locks." (In some computers, in fact, a given address can serve for either a port or a memory cell.)

"Peripheral" is Hardly the Word

Peripherals are nominally accessories. Actually, they're as important as the computer's memory or processor, for most computers exist in order to service these external devices.

The most familiar such peripherals are *terminals*. By now, we've all seen some terminals in our daily life: behind the counters at airline terminals, in banks, in schools, and many other places. A terminal usually combines a typewriter-like *keyboard* for input with a human-readable output device such as a video screen (CRT) or a *printer*. You input your questions or answers from the keyboard, and the computer shows both what you've typed and its responses and questions, either *displayed* on the CRT or *printed out* on paper.

Most home systems have CRT terminals, built-in or not, rather than printing (or *hard-copy*) terminals, because CRT terminals are quieter, cost less, and don't

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APF

Imagination Machine

Price: \$599.95

Description: 53-key keyboard; built-in RF modulator; built-in sound synthesizer (for three-octave musical scale); programmable in Basic with error-correction system; tape deck; three-digit tape counter; speaker; volume control.

Memory: 14K ROM; 9K RAM.

Accessories: Building block; plugs into computer and offers four additional universal ports/adaptors for attaching peripherals (\$199.95). 8K additional RAM (\$99.95). Mini-floppy disc interface cartridge FL-100, containing two discs (\$199.95). MP-1000 entertainment center, including joysticks (price: N.A.). Education, management, entertainment programs (\$19.95 to \$29.95 each).

Colors: 8

Resolution: 64 x 32 characters.

OHIO SCIENTIFIC

Superboard II

Price: \$299

Description: For the hobbyist; includes a 53-key keyboard; has no case.

Memory: 8K ROM; 4K RAM, expandable to 14K.

Accessories: Black-and-white TV (\$125). Mini-floppy disc (\$499). Dual mini-floppy (price: N.A.).

Color: b/w

Resolution: 256 x 256 dots.

Challenger/C1P MF

Price: \$1250

Description: Same as C1P, but with greater memory; includes black-and-white video monitor.

Memory: 12K, up to 32K RAM.

Accessories: AC remote control interface (\$175).

Color: b/w

Resolution: 256 x 256 dots.

Challenger/C4P

Price: \$698

Description: Same keyboard, etc. as other systems; includes audio output, interface for voice and music, printer interface, remote control and audio control, keypad, joystick interfaces.

Memory: 8K, up to 32K.

Accessories: AC15P, 12-inch color monitor (\$450).

Colors: 16

Resolution: 256 x 512 dots.

COMMODORE

PET 2001 Series

Price: \$795 (8K RAM); \$995 (16K RAM); \$1295 (32K RAM)

Description: Includes 14K ROM, video screen (45 characters x 25 lines), two 73-key keyboards (one for business, one for graphics).

Memory: 8K to 32K.

Accessories: Smart printer 2023; friction feed (\$695). Smart printer 2022; tractor feed, variable spacing (\$795). Disc drive 2040; dual drive, single floppy discs; 8K ROM, 4K RAM; dual density (\$1295). Disc drive 8050; dual floppy disc; 12K ROM, 4K RAM; dual density (\$1695). Modem acoustic coupler (\$395). Cassette deck (\$95). Voice synthesizer (\$395).

Color: b/w

Resolution: 20 x 25 characters.

Mattel's Intellivision

by Howard Blumenthal

For those who have not yet been introduced, Mattel's *Intellivision* is the Rolls Royce of videogames, a comparatively expensive machine designed to lift our game-playing society into the world of computers in two simple steps. The first step involves a device which Mattel Electronics calls a "master component," which is a very smartly designed "cartridge-programmable" game system—in other words, the master component is similar to the already popular Atari *Video Computer System* in that you can buy pre-packaged circuits which contain game instructions for the system. These circuits are packaged in cartridge form, and can be purchased at most department stores and video retailers. The second step allows owners of the "master component" to expand their systems into full-scale personal home computers; the addition will be available before Christmas and is designed to compete with the Radio Shack, Atari, Apple, Pet, and APF home computers. Recently, Tim Huber, a vice president at Mattel, understated the remarkable strategy employed in the design of *Intellivision*: "Mattel is offering a means to buy a custom computer system, one step at a time."

Since the first step is necessarily the gaming master component, Mattel starts the *Intellivision* user with a computer designed expressly to play games. The master component, introduced this past spring, normally retails for about \$300. The next step, at this point in time, is the keyboard component, which utilizes the master's processing strengths, and combines that power with full ASCII computer input capabilities (making the keyboard on *Intellivision*, which nobody has yet actually called a computer, very much like a computer indeed), along with a built-in cassette record-playback unit designed to allow users to store their own programs when they're not using Mattel's soon-to-be-introduced line of cassettes. With



Introduced last spring, Mattel's Master Component—used to play an expanding selection of games and other programs—sells for about \$300. It will be joined this fall by a keyboard component, at about \$500, turning it into a versatile home computer.

specialty designed cartridges for the master "game" component, a separate group of cartridges designed for use in the more prolific master component/keyboard component, and the cassettes that will eventually appear for the keyboard component, Mattel is introducing the concept of computer software without ever using those scary words. As an interesting contrast to the home computer industry's fairly common announcements about new hardware—new 80-line

and 120-line printers, disk-operating systems, and so forth—Mattel is virtually ignoring the hardware, never even caring to mention any potential introductions beyond the first two pieces of equipment. Instead, Mattel is selling their software—capitalizing on the leisure and entertainment uses of the new technologies.

"We're really in the entertainment business," Huber points out. "Mattel's *Preschool* is number two in its category; of course, the electronic hand-helds do very well; and we own the Ringling Brothers-Barum and Bailey Circus, as well as a few other entertainment interests."

The reasons why anybody buys a sys-

The author writes frequently about video and the new media. He has just completed a book about electronic games.

What is it, and why is everyone talking about this video game from the creators of Barbie & Ken?

tem of videogames are a lot like the reasons why someone buys a specific kind of tape machine—the machine that has the greatest program possibilities will ultimately be the best seller. And so it is with videogames. Atari has consistently made the best-selling videogames. Atari has consistently been the best-selling videogame manufacturer, primarily because their catalog of nearly 40 games tops the industry. Mattel started selling *Intellivision*'s master component with seven games, increased that number to nine within two months of the product's introduction, and plans to be selling 20 different cartridges by Christmas. That number, according to Huber, will double next year. "We plan to introduce 20 new cartridges every year."

Quantity, as every videocassette purchaser knows, doesn't always mean quality. Mattel's *Intellivision* games, however, promise to be as good as Mattel's hand-held games, perhaps even better.

Each of the games is played by using hand-held controllers, which in turn contain a 12-digit keypad (pressure-sensitive, like some of the newer calculators and electronic games) and a floating disc, which is an improvement upon the old-fashioned "joystick" control. Any game can be played with the amount of motor skills required to operate a touch-tone telephone—but the finesse needed to play a game really well can be considerable. As with any good game, the formats adjust themselves immediately to a balanced competition—and increased play almost always guarantees increased scores.

Each cartridge you buy comes with an instruction book. (These games are designed for long-range play, and they have some complexity—so you won't be able to just turn on and play. Plan on spending 10-20 minutes reading before you start play.) Along with the instructions comes a set of plastic overlays, which slip directly over the keypad, allowing precise, accurate control over all motion on the screen. In the case of *Major League Baseball*, the

overlays allow users to actually control every individual fielder on a nine-man team—a drastic improvement over the "you pitch and I'll hit" formats that described video baseball previously—and to throw the ball from player to player, with realistic time frames. A batter's sequence might follow a pattern like this: First, the pitcher selects one of eight different pitches (inside curve, fast ball, etc.), tapping the floating disc in the appropriate place to activate his decision. The batter then taps a button on his hand-held, choosing either to bunt or to "swing away." He swings, a shade late, and the ump calls a strike. The next pitch is thrown, the batter connects, and it flies to right field. At this point the batter uses his disc to move an on-screen runner along the basepath, while the defensive team first taps the correct player (the right fielder, in this case), who then runs after the ball, and, with another touch on the keypad, throws to the appropriate base. The runner literally races against the basemen, can get caught in run-downs between bases, and can even steal. And to top it all off, when the batter makes an out, an ump shouts, in computer slang, "Yer out."

This kind of detail, and pure devotion to the intricacies of playing a favorite and familiar game, makes *Baseball* a tremendous experience. Even an ordinarily dull race to a top point total called *Math Fun* becomes exciting because of the imagination employed in its design—two cartoon gorillas race along a river bank, advancing with every correct answer, stomping along in a very silly way, until an incorrect answer forces them into a river chock-full of alligators and other nasty beasts. *Poker and Blackjack*, normally a very prosaic affair, comes to life with an appropriately seedy gentleman dealer. Backgammon fans, who have had reason to be disappointed with previous video versions of their game, will find an extremely clear gameboard, great strategy-planning ability, and even a series of skill levels in the computer-opponent mode (the game may

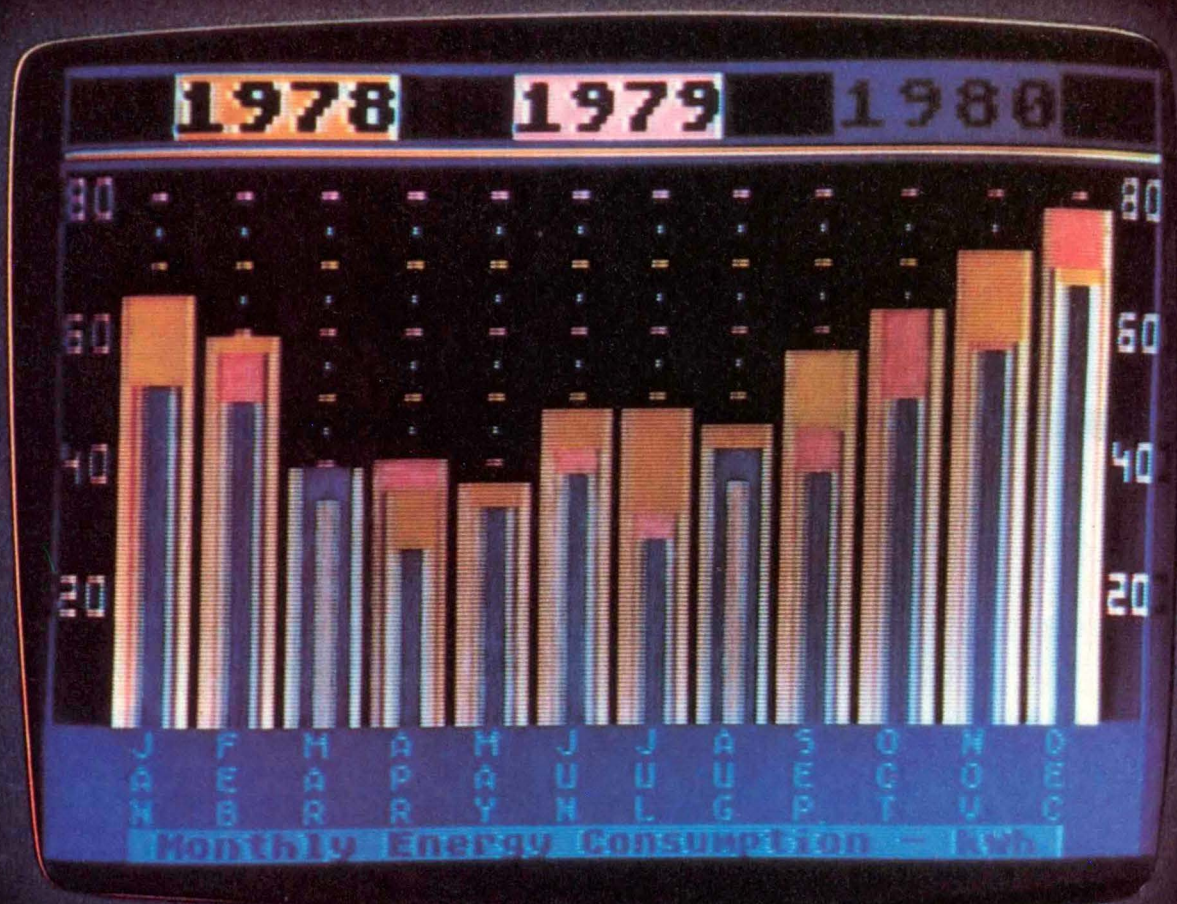
also be played by two players, but it's more fun to play against *Intellivision*).

The game cartridges are only the first step in an *Intellivision* software library. The second steps, due before Christmas, will serve the keyboard unit with lessons in *Speed Reading*, *Guitar Playing* (and *Music Composition*), *Conversational French*, as well as programs that will compute taxes, forecast astrological predictions, and assist in weight-loss procedures.

Intellivision owners in certain select cities across the nation and in Canada are now being offered an alternative to purchasing every cartridge in the catalog. In a test-market program called PlayCable, co-ventured by Mattel and Jerrold, a large cable-television equipment manufacturer, cable subscribers may buy a small box, known as a PlayCable adapter, for \$48. This box plugs directly into the game cartridge slot in the *Intellivision* unit, and draws game information from a master component at the cable station's point of origin, or head-end. Every month, subscribers will pay between \$6 and \$10 to receive unlimited 24-hour access to a finite group of selected game and computer programs (games only, in the test situation). And if the test market proves to be successful, PlayCable plans to start national introduction before next summer, which means that cable subscribers with *Intellivision* units (available from your cable company as well as local stores) may soon have access to an enormous library of games and computer programs. Testing began earlier this summer in Rochester, Minn., Jackson, Miss., Moline, Ill., and Boise, Id.

Intellivision's master component and accompanying games are expected to be one of the hottest items for Christmas. By next year, if Mattel is successful in their marketing strategies, *Intellivision* will not only be the world's most popular videogame center, but our favorite personal computer as well.





The Future Of Home Computing

by Martin Polon

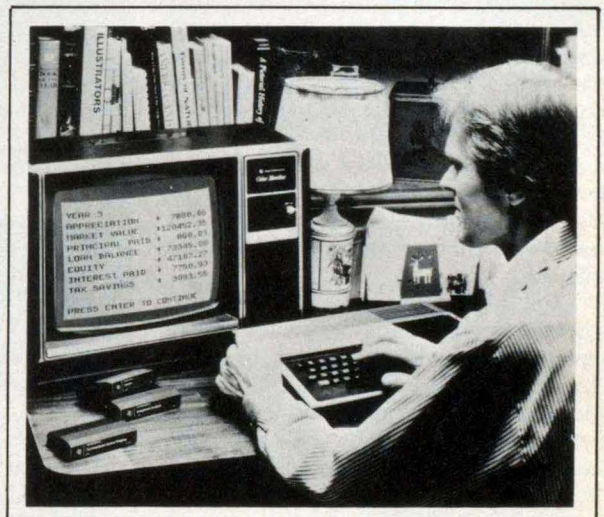
The dawn of the 1980s could also be called the dawn of the era of home computing. The information barrage presented to the home consumer on the possibilities and the future of computers would more than fill the memory of any computer worth its electronic chips.

We've already seen the cinema's visions of a computerized future—from Julie Christie fleeing the *Demon Seed* cybernaught (a computer with good



Many of today's personal computer products point the way toward tomorrow's electronic brainchilds. The Atari 800 (left) and APF's Imagination Machine (above) are examples of the newer breed of personal computers that also accept game cartridges, making the introduction to computers less intimidating for many beginners.

The Apple II Plus is one of the most popular models available, and the firm has just introduced its newest model, Apple III. As one of the more prominent and successful names specializing in home computers, Apple has contributed markedly to the current computer 'craze'.



Texas Instruments says its TI 99/4 computer is designed for the person who has never operated a unit before. It also sells an optional color monitor.

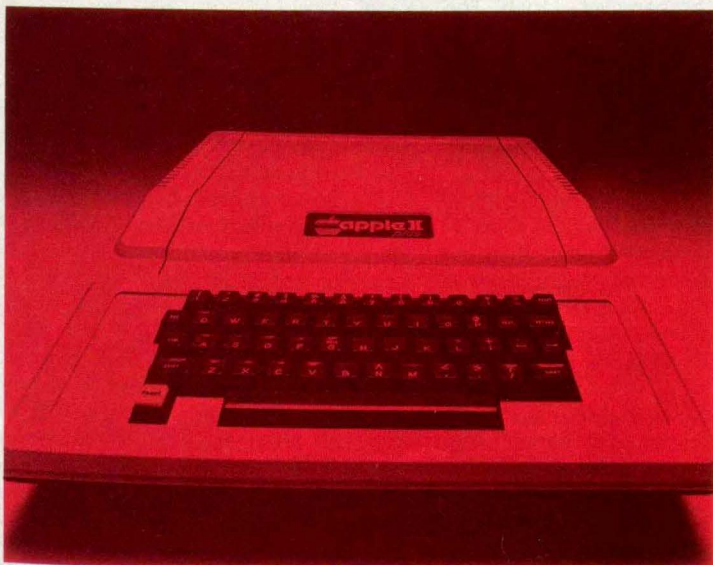
taste) to the regulated world of the future in Woody Allen's *Sleeper*, where sexual pleasures are provided by a computerized Orgasmatron.

These visions are matched by other, more somber predictions of a highly efficient, computerized society with almost all tasks being performed by computers, leaving people little else to do but watch their viewing screens. Though the next ten years certainly promise to be among the most exciting of this century as the computer becomes as essential to the home as the television set, the reality of our future with computers falls somewhere short of these scenarios.

Leaving the cinema for the realities, then, we can

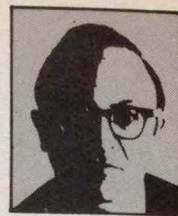
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The author is Associate Editor of this Magazine.



Video Programmer

by Ken Winslow



The Source Is With Us On-line Video Computers

The technology that, almost ten years ago, gave us video players and games has evolved to bring about the very complex and elaborate pieces of equipment called micro or personal video computers. They come equipped with microprocessors, relatively large memories, full "typewriter" keyboards, and, very often, their own high-resolution television screens.

The video computer has, in recent years, opened the way to newer and broader informational services. In general, video computers may be used in three different ways: with programs that someone else has created; with your own programs; or to connect to an external program—an on-line entertainment and information network. The first two uses will lead to the languages and mysteries of computers. But, if you are anything like us, it's the last use which will be of the most immediate interest.

During the past year, on-line video computer connections to a great wealth of entertainment and information have become economical and practical for individuals. Previously, only businesses and other large organizations could afford the on-line systems which provide quick access to great amounts of information assembled and offered by such services as *The New York Times*, Dow Jones, and UPI via computer network. But today, that information is available to private individuals, thanks to a company called Source Telecomputing Corporation—also known as the Source. If you have a personal video computer such as the Apple (which uses your TV set as the display screen) and a telephone connection, the Source will not only bring the *New York Times* information to your home at your own time and convenience, but will give you everything from current stock market quotations, a format for buying or selling your automobile or real estate, and help with your taxes, to biorhythm charts, sports scores, and airline schedules. Over 2000 different kinds of information and entertainment sources come to your video computer via



Apple's Stock Quote Reporter uses a telephone line to display figures & lets user make own bid.

the Source, and are updated regularly.

The cost is comparatively small. The one-time charge for registration and connection charge for the telephone accessory is \$100; use costs are as low as the charge for a phone call plus \$2.75 an hour during off-peak hours, or \$15 per hour from 7 a.m. to 6 p.m.

Personal video computer on-line information is so hot an idea that it is about to be offered by companies other than the Source; Compuserve, Inc., headquartered in Columbus, Ohio, says it is now preparing to offer similar low-cost connections to many different kinds of information sources as part of a "micronet service."

The Source tells us that they started offering their video computer network service about a year ago. They now have considerably over 10,000 subscribers and are adding them at the rate of over 500 a week. Next year they expect to have over 100,000 subscriptions. Almost any kind of a passive, or dumb, terminal with just a screen and a keyboard and with the ability to handle 300 baud, full duplex transmission can be used. The Source also says that

almost any kind of more elaborate personal computer can also be used, e.g. Apple, Radio Shack, Ohio Scientific, Texas Instruments, or PET. In fact, many stores selling video computers are trying to sign up Source subscribers. Chances are that some local outlet can tell you all about it and even give you a demonstration.

The Source stores all its information on central computers installed in Virginia and Maryland. When you become a subscriber, you are assigned your unique code number and given the telephone number by which you can contact the Source computers. There are well over 250 Source telephone numbers in as many different cities throughout the U.S. You make the connection to your video computer either by an acoustical coupler into which you place the telephone handpiece or, if your video computer has a built-in compatible connection, your phone line is wired directly.

The Source classifies its information by major groups. Among the general categories are: Business and Finance;

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Ken Winslow is an analyst and consultant to video program distributors and serves on many professional panels dealing with home video programming and technology.

Video Programmer

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Daily News and Features; Education, including instructional routines for children to follow in mathematics and language arts, as well as vocabulary drills in several languages; Entertainment Guide, including special events throughout the U.S. and abroad; Home Entertainment Guide, including a computer game library, wine-tasting information, and special gourmet recipes; Personal Finance, including a home buying-and-selling service; Travel Club; Money-Saver Service, by which you

might save up to 40% on major appliances via nationwide lowest-price searches; and something called Advanced (Computer) Applications and Programs for those who have a case of the byte fever.


Among the more interesting features of the Source are its communications and message services. Through the communications program known as "Chat," you can get in touch with other Source subscribers. By signing in and typing "on line" on your keyboard, you are given a list of the code numbers of all those who are signed in to "Chat" at the moment, displayed across your screen. (No names are used on-screen.) Then it's only a matter of asking one of those who are signed in if he would like to chat. The Source reports that

this service has had a very favorable response—much like the citizens' band radio. Of course, if you're signed in to use the Source's other services and don't want to "Chat," you merely type "refuse Chat" and go on your merry anti-social way.

Source Mail is another popular service. Any subscriber can file messages to other subscribers with the Source, which will hold them until they are picked up. Transmission can be as fast as 30 characters a second. It costs you 4.6¢ a minute in off-peak time to type in your message. The recipient, using a special, private code, can read it on his television screen or have it printed out on paper if he has a printer (as he can, in fact, do with all Source information.)

Whenever you sign into the system you can check your electronic mailbox to see if there are any messages for you by typing "Mailck." If there are none, the Source will tell you, "No mail at this time." If you get a lot of electronic mail, you can use a "Mail Read" function to scan it quickly. If you are expecting mail on a specific subject ("videocassettes") or from a specific sender ("TCA123"), you can ask to see these first. And, of course, you can get rid of junk mail almost by a press of a button.

What appeals to us about the Source and other such computer on-line or network services is the opportunity they afford us to work with computer capability in a very practical way without getting in too deeply. Instead of starting off with an expensive microcomputer or a tremendously more expensive printing word processor, one can begin with a fairly inexpensive but expandable passive terminal consisting of a 12-inch (or so) black-and-white screen, a full keyboard, and a telephone connection.

For more information, write: Source Telecomputing Corporation, 1616 Anderson Road, McLean VA 22102. 

TV Den

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generally they fall in the \$100 to \$200 range.

Since we're on the subject of price, a word of caution is in order. Just because audio on a VCR is inferior to other audio products is not reason enough to assume that a cheap mic will work as well as an expensive model.

The second way to classify a microphone is by its system of transmission. This is known in audio circles as the mic's transducer type. Without getting too technical, *condenser* mics rely on the smallest effective transducer system and therefore many condenser mics are about the size of a large tie clip. In fact, most news, sports, and talk shows use condenser mics because they are so easy to conceal. Condenser mics can be found in a wide variety of shapes and sizes, with almost every

Future of Computing

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draw a more accurate picture of the computerized home.

The television set, first of all, will be an integral part of the computer system, acting both as a display for data and as a visual output for information, games, and entertainment called up by the computer. Whatever form the television display will take as it evolves into flat screen or projected image, it will be the display for large-scale computer input. All the services described in this article will be available in the very near future. The hardware, or the computer itself, operates with infinite flexibility. The necessary sets of computer operating instructions, or software, are available, but may take some time to appear as firmware, or pre-programmed electronic circuits which can be plugged in to a computer to provide an automatic set of instructions. In other words, the future as described here is literally just around the electronic corner.

There are a multitude of home computers offered for use today. They range from the highly flexible and intelligent gaming and computing center of Mattel's Intellivision (which is designed to serve users who possess no computer skills), to the highly scientific and sophisticated Hewlett Packard HP-85 system (which can connect with other, much larger computers to serve as a terminal in a network). Both the Mattel and the Hewlett Packard could interchange many functions, and all the other companies in the home market, such as Radio Shack (TRS-80), Apple (II), Commodore (PET), Texas Instruments (99/4), and Atari (400 and 800), have designed flexible, expandable computer architectures.

Tomorrow's computer system is here today; or, if you will, today's computer will bring you tomorrow. All of the home computers are designed to be friendly to the user.

Personal financial records are going to be handled by the home computer. As a central bookkeeping center, the computer balances your checkbook register as it simultaneously keeps track of your various household bills: A computerized reminder will be displayed before a particular bill is due. The home computer will even be able to pay your bills, saving you the need to write checks, if you want that convenience. The entire financial record of a family can be placed into the computer for centralized safekeeping of all family financial records. The computer's records will be kept current by a simple updating task which will also allow an appraisal of your present financial situation. Further, the preparation of income taxes will be done by the computer, or, if you prefer the services of a skilled preparer, then the compiled information can be used for a tax record base.

The computer will keep track of all investments and, with access to other computers, will update a stock portfolio and produce a personalized statement on profit and loss every day. All of this information will be held safely in your own personal computer. It can be assigned a code so that only selected family members can have access to the information.

The home computer will not just do these sorts of tasks for you; it will also be a valuable educational tool. Lessons will be available in subjects that are now being taught in the schools. Computer Assisted Instruction (CAI) operates in an informal and exciting way; incorrect answers to its questions prompt the computer to bring up review materials which explain why an answer was in error. The video screen displays computer-generated illustrations for the educational programs. All dialogue between the user and the computer will be in normal English, with a student's answers typed into the keyboard. The home computer will be available to teach all of the members of the family in a wide variety of areas. Self-teaching programs will include such "extracurricular" subjects as chess (which can also be played against the computer), golf, and dance.

Teaching foreign languages is another educational service which the home computer can supply. It can provide examples of correct pronunciations, via either audiocassettes or speech synthesizer modules similar to those used in the Texas Instrument hand-held language translator and the new Japanese television sets that accept and respond to verbal commands. Proficiency in other languages will be reinforced by the computer's visual display and the verbal practice. Language skill levels will be increased via programs for higher levels of fluency.

The kitchen is the one room in the house which has not yet really benefitted from the changes in video computer technology. But in the very near future, the home computer will revolutionize this room. A TV set in the kitchen will display recipes; the choice of a week's menus will be done at the computer—the selection of dishes can be left up to the computer or done by the family; its memory will contain the equivalent of several cookbooks.

Not only will it specify the exact ingredients for a meal, but it will even control the sizes of individual portions based on nutritional needs and how many family members will be at a particular meal. The preparation of the meal will be outlined on the video screen, step by step. The computer will even be able to turn a microwave or convection oven on and off at the correct times. And, if that isn't convenient enough, the home computer will draw up the week's grocery list, which you can use when you go shopping, or simply transmit to the grocery discount warehouse, where the order can either be picked up or delivered.

The interconnection of the home computer with outside computers or program

networks is another wave of the future that is already being felt in the current worldwide surge of television information systems such as the British Ceefax and Oracle systems, the French Antiope system, and the North American Source system. The home computer with a VideoTex operating module will allow access to several hundred "pages" of information, ranging from stock exchange reports to airline schedules to a listing of Italian neighborhood restaurants in your city priced under \$10 per person.

The computer's ability to communicate will allow you to play the sophisticated computer games with opponents in another part of your city or even across the country. Such interactive computer gaming capability has already been incorporated by some cable television systems which offer computer gaming programs. The power of the computer to supply a full range of entertainment can be seen in the offerings of such games as baseball, football, basketball, hockey, auto racing, backgammon, checkers, chess, and horse racing. The various games will be available with the insertion of a gaming cartridge and the selection of an opponent—the computer, or a friend across the room or the country.


The home entertainment center will be interconnected with the computer system. Your audio and video recorders will be turned on and off to record specific programs according to a master calendar on the computer. A file of all record and tape albums and video programs on tape and discs can be kept on the computer, allowing complete indexing of all entertainment selections. And for those who like to watch something while they listen to their favorite music, the computer's video graphics capability can be used to create personalized visual accompaniments for the different records and audiocassettes.

Another valuable service of the home computer will be the monitoring of your energy uses. It can direct heating or air-conditioning only to those rooms that are being occupied. The times when you use energy can be monitored and set to make use of lower off-peak rates for gas or electricity.

The security of the home can also be regulated by computer sensors, which will sound an alarm at unauthorized entry and switch lights and radios on and off at predetermined times if the house is empty.

Further, there may be considerable advantages in using the home computer as a kind of electronic video work station. With its keyboard and word processing capability, the computer will take over the role of the conventional typewriter. Perfectly typed copy can be generated and displayed for output by a companion printer, or for direct electronic transmission to your recipient's display screen. In fact, much of the mail you receive today will be sent electronically to your home computer, where the touch of a key will display the day's entries.

The only electronic fly in this computer video ointment is the question of just how big will big brother be. Will your home computer serve you, or will it give you a big piece of 1984? The answer rests with the system of decentralized computing that has inspired the boom of home computers. The home computer system has all of its memory and computational functions within its operating system. That means that all the parts of the computer and its precious memory capacity are within your home and not accessible to those outside your home. Any interconnection to receive outside data is just that; a connection to momentarily receive input information. You physically own and control the computer and the access to it. That is why the home computer may well be the safest place to store your important financial data, since it can be given a code so complex that it would take 100 million operations to find it.

If it sounds like the home computer could become the second occupant of the house to be classified as man's (and woman's) best friend, that is just about the way the future computes. 

Computer Language

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need paper. But since it's often useful to have a permanent record of a program or its results, many systems eventually incorporate external printers as well.

Paper-tape punches and readers are also used in some home systems, especially those that use *teletypes* with built-in reader/punch devices as printing terminals. (Oliver sells an inexpensive reader; Heathkit has one of the lower-priced reader/punch devices.) Paper tape is slower, noisier, and less durable than cassette, and it can't be erased and reused. But since so many cassette interfaces speak such widely different codes, it's still popular as a form in which to distribute commercial programs to potential users. Its popularity is, however, waning fast.

Most prized of the common mass-storage devices is the *floppy-disk* system. This is a special form of tape recorder whose magnetic "tape" is actually disk instead of a ribbon. Its chief advantage is that the record/playback head can take a shortcut across the disk to move from the first item recorded to the last one; with tape, you'd have to wait while the computer wound its way past all the items in between. Some systems use 8-inch *diskettes*. Others take 5 1/4-inch *mini-floppies* that hold less. A typical 8-inch disk will hold about 200-250,000 bytes, while a typical mini holds about 70-80,000. Some systems record twice as much per side (*double-density*) or use both sides (*double-sided*).

The last category of peripherals will eventually be the most important, though

they're not too common now: controls for household devices. Already there are straws in the wind. Several manufacturers (Gimix, for one) make computer interfaces that can turn a number of outside devices on and off. BSR makes a control system that lets you turn devices on and off and dim or brighten lights by pushing buttons on a remote box—but they plan computer interfaces for the system. Gimix makes a hi-fi control system that plugs into any amplifier or receiver with tape monitor connections; it offers remote input selection, volume control, and system power on/off. (Crown also makes a preamplifier, the DL-2, that can be controlled by an external computer, through a built-in parallel port.)

What's holding up computer control of household devices isn't the computers—they're ready now. What's needed is more household devices designed for external computer control. 

Post Production

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have an idea that is a five-minute idea, then you do a five-minute tape. A lot of people are just starting and it's a lot easier to get an idea that's a five- or ten-minute idea than to make up an hour show." Although the market for privately produced home video is in its infancy, it contains such abundant and obvious potential that no one can guess the size or direction it will take in the future. Naturally, Bell & Howell follows this phase of the Center's work with very great interest.

The Center's staff has also discussed producing a show with the magazine format, but has been stymied so far because of the great amount of tape and talent such a production, even an experimental one, would consume.

Neal and the other staff members see their roles as providing both the structure for the Center and the mediation among the Center's members and their different views of the use of video, be it artistic, journalistic, or proto-commercial. Neal's own interest in the medium reflects all of its uses. She has worked as a video artist and as a documentarian, and appreciates good work in the medium, whatever its use or intention.

The Center has three editing rooms to handle 1/2-inch and 3/4-inch tape as well as screening rooms which double as classrooms for the workshop classes. There are five classes in the series—pre-production planning, lighting, scripting, audio techniques, and the use of the camera. These are open to non-members and members alike. Three additional workshops, offered only to members at no additional charge, concern editing techniques and the use of portapak systems. There is also an intensive ten-week course to prepare people for the FCC First

Arcade Alley

continued from page 12

plete control of the ball's flight from the mound to home plate, but Mattel's version does yield a wide enough variety of pitches to keep most of the hitters honest.

The only other flaw in an otherwise ideal program is that all batted balls are grounders and must be handled accordingly. Unlike other games, however, all fielders are movable. The manager presses the picture of the player on the overlay whom he wants to move and then uses the direction disc. To throw the ball, just push the spot on the overlay that corresponds to the desired destination, and the computer takes over.

NFL Football (2610-0920A) will make video arcade lovers think they've died and gone to Super Bowl heaven. No other video football includes the variety of plays found in this cartridge. Coaches can choose from among 160 offensive combinations and 10 different defensive formations.

As with most other home arcade versions of football, the coach can actively move only one player at a time, while the machine takes care of the rest. On offense, this means directing the quarterback until he passes, at which point control automatically switches to the receiver. What makes **NFL Football** so different is the amount of pre-programming the coaches can use to guide the rest of the team.

During the huddle, the coach of the team with the ball punches in the type of play (run, pass, or kick), one of the nine possible formations, and if it is a pass, the identity of the receiver and the zone of the field to which the quarterback will direct his aerial. At the same time, the other coach chooses one of the defensive sets, though the game provides the chance to call a defensive audible to alter the alignment at the line of scrimmage.

The sole controlled defender must be used carefully. An occasional blitz keeps the other team honest, but too much gambling gives too many scoring opportunities. Occasionally, the computer-operated defensive men will pull off great plays when the human coach bungles, but it isn't wise to count on it.

NBA Basketball (2615-0920A). This one will have fans cheering from the moment the two three-man teams lope onto the court for the opening tap until the final whistle. The trapezoidal playfield gives coaches a court-side view of the action; grandstand, scoreboard, and functional 24-second shot clock set an appropriate stage for four quarters of basketball.

The passing system is superb. The keypad overlays display each team's offensive half-court divided into nine zones. Pushing a zone on the keypad sends the ball to the designated spot. The computer directs one of the passer's teammates there to catch it, if possible, which im-

mediately switches control to that player. Coaches can tell which on-screen man is under their direction at a glance, since players turn a darker color to reflect such active status.

On defense, the gamer moves only one man, but the computer-controlled ones more than hold up their responsibilities. They go for the steal, try to block shots and, in general, make life miserable for the team with the ball. When first learning the game, don't be surprised if the computer-run men turn in most of the outstanding plays.

The offensive team can choose either a set or jump shot, with the computer determining success based on court position and type of shot. Blocking can be murderously effective, so a wise coach keeps a finger poised on the proper key whenever the other team has the ball.

Strategy is the same as for genuine basketball: pass to the open man, work for a high-percentage inside shot, and get back quickly on defense. The only elements this game lacks are free throws and free agents. There's also no video version of Darryl Dawkins to smash your backboards, but don't bet that the wizards at Mattel aren't already working on it. **V**

Nautilus Complex

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hips and thighs, eat right to keep fit, or prevent sports injuries. Videocassettes compatible with today's recorders will be on the market next year. NTN will also produce a series of sports training tapes for weekend, college, and professional athletes. Top pros from all sports will talk about proper training techniques, particularly how to lose fat and gain strength using Nautilus machines, plus give flexibility drills and instruction in honing skills. The tapes take viewers through specific body movements—perhaps showing them how to put more power into their first serve. Freeze frame and slow-motion special effects give them time to compare themselves with the top athletes on screen. "Most people exercise to play or run better, or to handle the stresses of everyday life," Farnham says. "We're going to grab them in their living rooms and have them grunt and groaning into the 21st Century."

Video equipment will also help orthopedic surgeon Michael Fulton do biomechanical research at the next-door Orthopedic Clinic of Lake Helen. The young sports-medicine specialist just reopened the clinic, which had been moribund for a year and a half as Nautilus searched for the right person to run it, Farnham says. Special video effects will aid Dr. Fulton's work in the human-performance laboratory and two Olympic-size swimming pools being built by Nautilus to study athletes' physiological profiles and potential for injury.